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		1753		

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/632,573

Applicant(s)

SIEBERT ET AL.

Examiner

ALEX NOGUEROLA

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11-13, 16-30 and 33-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-13, 16-30 and 33-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/04/00 07/28/03; 3/22/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claim 23 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,613,212 in view of Young et al. (US 5,290,587) ("Young I").

Claim 1 of U.S. Patent No. 6,613,212 does not require a portion of the outside of a wall of the capillaries between the impact of the excitation light beam and the exit of the capillaries to be blackened. Young I discloses an electrophoresis capillary with a blackened portion of the outside of the wall of the capillary between the impact of the excitation beam and the end of the capillary. See the abstract and Figure 4. Also note the embodiment shown in Figure 3, which allows an excitation light beam to impact a portion of the capillary wall. It would have been obvious to one with ordinary skill in the art at the time of the invention to blacken the walls of

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the electrophoresis capillaries in Claim 1 of U.S. Patent No. 6,613,212 as taught by Young I because as taught by Young I this will permit increased control over the electroosmotic flow for improved electrophoresis analysis. See col. 3, ll. 13-16.

3. Claim 24 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,613,212. Claim 23, from which claim 24 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of U.S. Patent No. 6,613,212 requires the detection means to have a resolution as specified by claim 24 of the instant application.

4. Claim 25 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 2 of U.S. Patent No. 6,613,212. Claim 23, from which claim 25 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 2 of U.S. Patent No. 6,613,212 requires a linear array as claimed.

5. Claim 26 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 3 of U.S. Patent No. 6,613,212. Claim 23, from which claim 26 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 3 of U.S. Patent No. 6,613,212 requires an excitation light beam as claimed.

6. Claim 27 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 4 of U.S. Patent No. 6,613,212. Claim 25, from which claim 27 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 4 of U.S. Patent No. 6,613,212 requires focusing means as claimed.

7. Claim 28 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 5 of U.S. Patent No. 6,613,212. Claim 25, from which claim 28 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 5 of U.S. Patent No. 6,613,212 requires the exiting beam to be focused as claimed.

8. Claim 33 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 10 of U.S. Patent No. 6,613,212. Claim 23, from which claim 33 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 10 of U.S. Patent No. 6,613,212 requires complete imaging of the light exiting the capillaries.

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9. Claim 34 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 11 of U.S. Patent No. 6,613,212. Claim 23, from which claim 33 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 11 of U.S. Patent No. 6,613,212 requires a CCD as claimed.

10. Claim 35 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 12 of U.S. Patent No. 6,613,212. Claim 23, from which claim 35 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 12 of U.S. Patent No. 6,613,212 requires a CCD and a fiber bundle as claimed.

11. Claim 40 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 13 of U.S. Patent No. 6,613,212. Claim 27, from which claim 40 depends, has been addressed above. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 13 of U.S. Patent No. 6,613,212 requires at least one microlens.

Claim Rejections - 35 USC § 112

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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13. Claims 1-8, 11-13, 16-30, and 33-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention:

a) Claim 1, line 2: the scope of the "at least one source" is indefinite as it is only followed by intended uses ("for the emission of a light beam intended to excite molecules ..."). The examiner suggests that in line 2 -- configured -- be inserted between "source" and "for" and in line 3 "intended" be deleted;

b) Claim 7 requires the second liquid to be in a space between the capillaries; however, claim 1 requires the second liquid to be inside of the capillaries. Is the second liquid then the same as the first liquid?

c) Claim 21, line 2: -- at least one -- should be inserted between "the" and "source";

d) Claim 23, line 4: the scope of the "at least one source" is indefinite as it is only followed by intended uses ("for the emission of a light beam intended to excite molecules ..."). The examiner suggests that in line 4 -- configured -- be inserted between "source" and "for" and in line 4 "intended" be deleted; and

e) Claim 29 requires a second liquid. There is no antecedent for a first liquid.

14. Note that dependent claims will have the deficiencies of base and intervening claims.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

16. Claims 1-7, 11, and 12 are rejected under 35 U.S.C. 102(a) as being anticipated by the JPO computer translation of Shimadzu (JP 10-019846 A) (“Shimadzu”).

Addressing claim 1, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Addressing claim 2, a resolution as claimed is implied by paragraph [0014] of the Detailed Description, which discloses, for example, suppressing light dispersion in the capillary tube.

Addressing claim 3, at least one linear array as claimed may be seen in Figure 2.

Addressing claim 4, the additional limitations of this claim may be found in Figure 2.

Addressing claim 5, the additional limitation of this claim note optical system 22 in Figure 2 and see paragraphs [0012]-[0014] of the Detailed Description.

Addressing claim 6, the additional limitations of this claim may be found in Figure 2.

Addressing claim 7, note that since the ends of the capillaries are immersed in the lower buffer tub (3) there will be liquid between the ends of the capillaries. Also, as noted in the rejection of claim 1, the first liquid is the same as the second liquid.

Addressing claim 11, for the additional limitation of this claim note display 8 in Figure 2 and see paragraphs [0012]-[0014] of the Detailed Description.

Addressing claim 12, for the additional limitations of this claim see paragraphs [0012]-[0014] of the Detailed Description.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 8, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the JPO computer translation of Shimadzu (JP 10-019846 A) ("Shimadzu").

Addressing claim 8, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Also, at least one linear array as claimed may be seen in Figure 2.

Also, for the focusing means of claim 5, note optical system 22 in Figure 2 and see paragraph [0014] of the Detailed Description

Shimadzu does not mention whether the second liquid is transparent and non-fluorescent; however, since the second liquid is buffer solution it will almost certainly be aqueous and thus transparent and non-fluorescent. In any event, it would have been obvious to one with ordinary

skill in the art at the time of the invention to have the second liquid transparent and non-fluorescent so as not to interfere with the fluorescent detection of the separated sample analytes.

Addressing claim 20, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Although not to scale Figure 2 appears to show a distance within the claimed range. In any event, barring a showing to the contrary, such as unexpected results, the specified distance is essentially arbitrary. The excitation beam will be located to impact the capillaries at a location that will allow sufficient separation of the analytes of interest for detection.

Addressing claim 22, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Also, at least one linear array as claimed may be seen in Figure 2.

Also, for the focusing means of claim 5, note optical system 22 in Figure 2 and see paragraph [0014] of the Detailed Description

The optical system 22 comprises lenses. See paragraph [0012] of the Detailed Description. Since the optical system 22 is used to focus a laser beam it would have been obvious to one with ordinary skill in the art at the time of the invention to use microlenses.

21. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over the JPO computer translation of Shimadzu (JP 10-019846 A) ("Shimadzu") in view of the Derwent abstract of Hitachi (JP 03092756 A).

Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Shimadzu does not require of a fiber bundle interposed between the exits of the

capillaries and the charge-coupled device (CCD). In Shimadzu the fluorescence emissions from the analytes in the capillaries are directed to the CCD via an optical system comprising a mirror a series of lenses. See Figure 2. Hitachi discloses a fiber bundle interposed between the exits of the lanes of an electrophoresis cassette and a detection device. See the abstract and Figure 1.

It would have been obvious to one with ordinary skill in the art at the time of the invention to use a fiber bundle as taught by Hitachi instead of an optical system comprising a mirror and a series of lenses in the invention of Shimadzu because it is simpler and less prone to error. An optical system comprising a mirror and a series of lenses is more prone to error than a fiber bundle because of the possibility of misalignment of the optical elements. A fiber bundle is also simpler to install than an optical system comprising a mirror and a series of lenses.

22. Claims 16, 23-30, 33, 34, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the JPO computer translation of Shimadzu (JP 10-019846 A) ("Shimadzu") in view of the Young (US 5,290,587) ("Young I") and Young et al. (US 5,240,585) ("Young II").

Addressing claim 16, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high

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enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description), a first liquid is disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid is disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid has first refractive index and the second liquid has a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal).

Shimadzu does not mention having a portion of the outside of the wall of the capillaries between the impact of the excitation beam and the end of the capillaries blackened.

Young I discloses an electrophoresis capillary with a blackened portion of the outside of the wall of the capillary between the impact of the excitation beam and the end of the capillary. See the abstract and Figure 4. Also note the embodiment shown in Figure 3, which allows an excitation light beam to impact a portion of the capillary wall. Young II discloses other embodiments with a detection portion in the capillary wall. See Figures 3 and 5. It would have been obvious to one with ordinary skill in the art at the time of the invention to blacken the walls of the electrophoresis capillaries in Shimadzu as taught by Young I because as taught by Young I this will permit increased control over the electroosmotic flow for improved electrophoresis analysis. See col. 3, ll. 13-16.

Addressing claim 23, Shimadzu discloses a multicapillary electrophoresis system comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description).

Shimadzu does not mention having a portion of the outside of the wall of the capillaries between the impact of the excitation beam and the end of the capillaries blackened.

Young I discloses an electrophoresis capillary with a blackened portion of the outside of the wall of the capillary between the impact of the excitation beam and the end of the capillary. See the abstract and Figure 4. Also note the embodiment shown in Figure 3, which allows an excitation light beam to impact a portion of the capillary wall. Young II discloses other embodiments with a detection portion in the capillary wall. See Figures 3 and 5. It would have been obvious to one with ordinary skill in the art at the time of the invention to blacken the walls of the electrophoresis capillaries in Shimadzu as taught by Young I because as taught by Young I this will permit increased control over the electroosmotic flow for improved electrophoresis analysis. See col. 3, ll. 13-16.

Addressing claim 24, a resolution as claimed is implied by paragraph [0014] of the Detailed Description, which discloses, for example, suppressing light dispersion in the capillary tube.

Addressing claim 25, at least one linear array as claimed may be seen in Figure 2.

Addressing claim 26, the additional limitations of this claim may be found in Figure 2.

Addressing claim 27, the additional limitation of this claim note optical system 22 in Figure 2 and see paragraphs [0012]-[0014] of the Detailed Description.

Addressing claim 28, as seen in Figure 2 the beam exiting the side of one capillary of one linear array is focused onto an adjacent juxtaposed capillary within a following linear array.

Addressing claim 29, Shimadzu also discloses a first liquid disposed outside the capillaries (liquid in buffer tub 2 or 3), and a second liquid disposed inside of the capillaries (buffer solution from buffer tubs 2 or 3; paragraph [0010] of the Detailed Description), the first liquid having first refractive index and the second liquid having a second refractive index, wherein the first refractive index is equal to the second refractive index (since the first and second liquids are the same their refractive indices will be equal). Since the ends of the capillaries are immersed in the lower buffer tub (3) there will be liquid between the ends of the capillaries.

Addressing claim 30, Shimadzu does not mention whether the second liquid is transparent and non-fluorescent; however, since the second liquid is buffer solution it will almost certainly be aqueous and thus transparent and non-fluorescent. In any event, it would have been obvious to one with ordinary skill in the art at the time of the invention to have the second liquid transparent and non-fluorescent so as not to interfere with the fluorescent detection of the separated sample analytes.

Addressing claim 33, for the additional limitation of this claim note display 8 in Figure 2 and see paragraphs [0012]-[0014] of the Detailed Description.

Addressing claim 34, for the additional limitations of this claim see paragraphs [0012]-[0014] of the Detailed Description.

Addressing claim 38, although not to scale Figure 2 appears to show a distance within the claimed range. In any event, barring a showing to the contrary, such as unexpected results, the specified distance is essentially arbitrary. The excitation beam will be located to impact the capillaries at a location that will allow sufficient separation of the analytes of interest for detection.

Addressing claim 40, the optical system 22 comprises lenses. See paragraph [0012] of the Detailed Description. Since the optical system 22 is used to focus a laser beam it would have been obvious to one with ordinary skill in the art at the time of the invention to use microlenses.

23. Claims 17, 18, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the JPO computer translation of Shimadzu (JP 10-019846 A) ("Shimadzu") in view of the Young (US 5,290,587) ("Young I") and Young et al. (US 5,240,585) ("Young II") as applied to claims 16, 23-30, 33, 34, 38, and 40 above, and further in view of Haddad et al. (US 6,054,032) ("Haddad").

Addressing claim 17, Shimadzu as modified by Young I and Young II does not mention gluing the capillaries to a support. Haddad discloses a support for a capillary array that holds the capillaries with glue. See the abstract; Figures 1A -3 B; and col. 2, ll. 33-39. It would have been obvious to one with ordinary skill in the art at the time of the invention to use a support as taught by Haddad in the invention of Shimadzu as modified by Young I and Young II because then the capillaries can be readily aligned precisely and reproducibly. See col. 1, ll. 50-62 and col. 3, ll. 55-59.

Addressing claim 18, Haddad discloses that a variety of adhesives or glues may be used and that they maybe transparent or not transparent. See col. 6, ll. 17-26 and col. 5, ll. 59-65. Baring a showing of unexpected results, whether the glue is transparent or not will just depend on whether the glue will be in a detection region.

Addressing claim 37, Shimadzu as modified by Young I and Young II does not mention gluing the capillaries to a support. Haddad discloses a support for a capillary array that holds the capillaries with glue. See the abstract; Figures 1A -3 B; and col. 2, ll. 33-39. It would have been obvious to one with ordinary skill in the art at the time of the invention to use a support as taught by Haddad in the invention of Shimadzu as modified by Young I and Young II because then the capillaries can be readily aligned precisely and reproducibly. See col. 1, ll. 50-62 and col. 3, ll. 55-59. Haddad also discloses that a variety of adhesives or glues may be used and that they maybe transparent or not transparent. See col. 6, ll. 17-26 and col. 5, ll. 59-65. Barring a showing of unexpected results, whether the glue is transparent or not will just depend on whether the glue will be in a detection region.

24. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over the JPO computer translation of Shimadzu (JP 10-019846 A) ("Shimadzu") in view of the Derwent abstract of Hitachi (JP 03092756 A), Young (US 5,290,587) ("Young I"), and Young et al. (US 5,240,585) ("Young II").

Shimadzu discloses a multicapillary electrophoresis system

comprising a plurality of juxtaposed capillaries (abstract and Figure 2), at least one source (20) for the emission of a light beam to excite molecules lying in its path and inside the capillaries (Figure 2) and means (7) for detecting the fluorescence of the molecules excited by the light beam, wherein the means are arranged so as to detect light which emerges at the exit of the capillaries and which propagates along the direction in which the capillaries extend (Figure 2 and paragraph [0009] of the Detailed Description), the resolution of the detection means is high enough to distinguish light which emerges at the exit of each of the capillaries (paragraph [0014] of the Detailed Description).

Shimadzu does not mention having a portion of the outside of the wall of the capillaries between the impact of the excitation beam and the end of the capillaries blackened.

Young I discloses an electrophoresis capillary with a blackened portion of the outside of the wall of the capillary between the impact of the excitation beam and the end of the capillary. See the abstract and Figure 4. Also note the embodiment shown in Figure 3, which allows an excitation light beam to impact a portion of the capillary wall. Young II discloses other embodiments with a detection portion in the capillary wall. See Figures 3 and 5. It would have been obvious to one with ordinary skill in the art at the time of the invention to blacken the walls of the electrophoresis capillaries in Shimadzu as taught by Young I because as taught by Young I this will permit increased control over the electroosmotic flow for improved electrophoresis analysis. See col. 3, ll. 13-16.

Shimadzu as modified by Young I and Young II does not require of a fiber bundle interposed between the exits of the capillaries and the charge-coupled device (CCD). In Shimadzu the fluorescence emissions from the analytes in the capillaries are directed to the CCD

via an optical system comprising a mirror a series of lenses. See Figure 2. Hitachi discloses a fiber bundle interposed between the exits of the lanes of an electrophoresis cassette and a detection device. See the abstract and Figure 1. It would have been obvious to one with ordinary skill in the art at the time of the invention to use a fiber bundle as taught by Hitachi instead of an optical system comprising a mirror and a series of lenses in the invention of Shimadzu as modified by Young I and Young II because it is simpler and less prone to error. An optical system comprising a mirror and a series of lenses is more prone to error than a fiber bundle because of the possibility of misalignment of the optical elements. A fiber bundle is also simpler to install than an optical system comprising a mirror and a series of lenses.

Status of Rejections pending since the Office action of May 12, 2004

25. All previous rejections are withdrawn.

Specification

26. An application in which the benefits of an earlier application are desired must contain a specific reference to the prior application(s) in the first sentence of the specification or in an application data sheet (37 CFR 1.78(a)(2) and (a)(5)). The specific reference to any prior nonprovisional application must include the relationship (i.e., continuation, divisional, or continuation-in-part) between the applications except when the reference is to a prior application of a CPA assigned the same application number.

Allowable Subject Matter

27. Claims 19, 21, 36, and 39 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims and if a terminal disclaimer against U.S. Patent No. 6,613,212 is submitted.

28. The following is an examiner's statement of reasons for allowance:

a) Claim 19: the nonobvious limitation in the combination of limitations is the requirement that "one end of the capillaries is disposed in a cell under pressure."

In Shimadzu the ends of the capillaries are in buffer tanks at ambient pressure. It would not have been obvious to pressurize either of the buffer tanks because sample is electrokinetically introduced into the ends of the capillaries in the top tank (paragraph [0014] in the Detailed Description) and if the bottom buffer tub is pressurized this will act adversely against the separation of the analytes.

b) Claim 21: the nonobvious limitation in the combination of limitations is the requirement that of a mirror facing the source on the side of the capillaries which is opposed to the source.

In Shimadzu the mirror is facing the ends of the capillaries. See Figure 2. It would not have been obvious to move the mirror so that it will be facing the source on the side of the capillaries which is opposed to the source because the detection system is

configured for end-column detection. With the detection configuration shown in Figure 2 the ends of the capillary array in buffer tank 3 are readily imaged onto an array of corresponding detection elements in the CCD. If the mirror is moved so as to face the source on the side of the capillaries which is opposed to the source it will not be so simple to image the fluorescent signals from the capillaries onto the corresponding detection elements in the CCD.

c) Claim 36: the nonobvious limitation in the combination of limitations is the requirement that the first liquid outside of the plurality of juxtaposed capillaries be less than that of the second liquid inside the plurality of juxtaposed capillaries. In Shimadzu the first liquid and the second liquid have the same refractive index. It would not have been obvious to have the first and second liquids have different refractive indices because the first liquid and the second liquid are the same buffer solution. Additionally, as seen in Figure 2 the first liquid and the second liquid are in intimate contact as there is continuous fluid communication between the upper tank and the lower buffer tank through the capillaries.

d) Claim 39: the nonobvious limitation in the combination of limitations is the requirement that of a mirror facing the at least one source on the side of the capillaries which is opposed to the source.

In Shimadzu the mirror is facing the ends of the capillaries. See Figure 2. It would not have been obvious to move the mirror so that it will be facing the source on the

side of the capillaries which is opposed to the source because the detection system is configured for end-column detection. With the detection configuration shown in Figure 2 the ends of the capillary array in buffer tank 3 are readily imaged onto an array of corresponding detection elements in the CCD. If the mirror is moved so as to face the source on the side of the capillaries which is opposed to the source it will not be so simple to image the fluorescent signals from the capillaries onto the corresponding detection elements in the CCD.

e) Gilby (US 5,194,915) is relevant to the invention of claim 1, but patentably distinct from the invention of claim 1 because the refractive index of the liquid disposed outside the capillary is *less* than the refractive index of the liquid disposed inside the capillary. See col. 3, ll. 5-9. It would not have been obvious to have the refractive index of the liquid disposed outside the capillary be equal or superior to the refractive index of the liquid disposed inside the capillary because the refractive index of the liquid disposed outside the capillary is purposefully less than the refractive index of the liquid disposed inside the capillary so that the excitation light beam will be guided along the direction in which the capillary extends. See col. 2, ll. 15-26; Figures 1 and 3; and col. 4, ll. 15-30.

A further distinction between Gilby and the invention of claim 1 is that claim 1 also requires that the detection "means are arranged so as to detect light which emerges at the exit of said capillaries and which propagates along the direction in which said capillaries extend." This limitation is linked with the limitation regarding respective refractive indices of the first liquid and the second liquid. In Gilby (US 5,194,915)

although the detection means is arranged so as to detect light that emerges at the exit of a capillary, the detection means does not detect light that propagates along the direction in which the capillary extends. The detection means detects light that propagates at an oblique or right angle to the direction in which the capillaries extend. See Figure 1. Since the liquid outside the capillary acts as a wave-guide for the excitation light and at least a portion of the sheath flow cell is transparent to fluorescent light (col. 3, ll. 35-41) it would not have been obvious to interchange the detector and the excitation light source.

f) The previous examiner had rejected claims 1-3 as being clearly anticipated under 35 U.S.C. 102(b) by Kambara in the Office action of March 25, 2003. This rejection was apparently withdrawn in response to Applicant's amendment of July 28, 2003 as it was not mentioned in the Final Rejection of October 20, 2003 or the Advisory Action of May 12, 2004. Furthermore, although in Kambara the refractive index of the first liquid (sheath liquid), which is disposed outside the capillary, is equal to the refractive index of the second liquid, which is disposed inside the capillaries, as both the first and second liquids are buffer solution (col. 6, ll. 53-59 and col. 9, ll. 1-23), the sources (21,22) configured for the emission of a light beam to excite molecules lying in its path are not also configured to excite molecules inside the capillaries. The excitation light sources are configured for post-column detection. The excitation light sources are configured so that a laser beam will pass below and beyond the ends of the capillaries. See col. 7, 7-26. It would not have been obvious to modify Kambara so that the light beam will excite molecules inside the capillaries because this will add a source of error through optical

effects such as absorption, refraction, and background capillary fluorescence, which can be significant, especially with a large array of capillaries. As Kambara is currently configured the excitation light will pass more directly to the analyte molecules to be excited than if it were to pass through several capillaries.

g) The previous examiner had rejected claims 1-3 as being clearly anticipated under 35 U.S.C. 102(b) by Dovichi in the Office action of March 25, 2003. This rejection was apparently withdrawn in response to Applicant's amendment of July 28, 2003 as it was not mentioned in the Final Rejection of October 20, 2003 or the Advisory Action of May 12, 2004. Furthermore, although in Dovichi the refractive index of the first liquid (sheath liquid), which is disposed outside the capillary, is equal to the refractive index of the second liquid (col. 4, ln. 62 – col. 5, ln. 3), which is disposed inside the capillaries, the source (130) configured for the emission of a light beam to excite molecules lying in its path is not also configured to excite molecules inside the capillaries. The excitation light source is configured for post-column detection. The excitation light source is configured so that a laser beam will pass directly beneath the ends of the capillaries. See Figures 2 and 11. It would not have been obvious to modify Dovichi so that the light beam will excite molecules inside the capillaries because this will add a source of error through optical effects such as absorption, refraction, and background capillary fluorescence, which can be significant, especially with a large array of capillaries. As Kambara is currently configured the excitation light will pass more directly to the analyte molecules to be excited than if it were to pass through several capillaries.

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29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alex Noguera

Primary Examiner

AU 1753

November 5, 2004